Modern industrialization around the castle town Ogaki

The process to acquire the resilient urban infrastructure

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Abstract

This study focuses on Ogaki as a typical example of a local city in Japan, reveals the process of modernizing the urban management method. In this process, urban structure was renovated with adding new infrastructures on the composition of the previous period. It shows that building of the infrastructure system for modern industry in Ogaki City had been carried out with the collaboration not only among several vertical administrative systems, but between the ex-samurai class and merchants. Ogaki City began to change rapidly after the 1920s, when a comprehensive regional water infrastructure system beyond the scale of the city was implemented. City planning was institutionalized in the middle of this foundation construction process and supported the realization of the concept shared among merchants. In the stage when the Street Network (1930) and the Canal Project (1937) were decided as the city planning, the cooperative relationship between flood control, energy supply, and water and land transportation had been completed. The concept of industrial urbanization was shared even in a state where there was no manifestation of the master plan, and the city planning was institutionalized in the middle of this foundation construction process and supported the realization of this concept.

Keywords

Local City Planning of Japan, Ogaki, Castle Town, Modern Industries, River Improvement, Industrial Logistics, Modern Local Organization.

How to cite

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INTRODUCTION

In this study, we discuss the urban modernisation process in Ogaki, an example of a typical Japanese provincial city. During this process, the urban environment was renovated through the addition of new infrastructure. The infrastructure required for modern industry was built as a collaboration among several vertical administrative systems and the public and private sectors, including the ex-samurai class and merchants. The population of Ogaki was 28,333 in 1920, which was small compared to the typical medium-scale town of Shizuoka, which had a population of 74,093 at the same age.

The name *Japanese castle towns* was introduced by Kostof (1991) to denote the centralised political system constructed by feudal lords in the 16th and 17th centuries. The keep was typically situated in the centre of the town, and residents of the vassals were arranged around the keep, protected by ramparts and moats. The towns also contained a ring of temples and shrines, then another of merchants and artisans.[1] Satoh (1995) clarified the fundamental patterns and differences between Japanese castle towns. He also discussed how these towns transitioned to the modern era and showed that some layouts of the City Planning Road Webs were influenced by those in castle towns. These were sorted into 10 types. However, previous studies overlooked the fact that the majority of the castle towns aimed to become industrial modern cities after the Meiji Restoration. Asano (2005) investigated the intentions of city planning in 43 small- and medium-scale cities during the Taisyo era (until 1926). Among the 43 cities, including Ogaki, there were 24 castle towns, and half of them declared themselves to be industrial cities[2]. Considering that Ogaki, which was obviously aiming to become an industrial city, did not make a similar declaration, more examples should be found. The urban composition of castle towns generally changed significantly after the construction of main railways such as the Tokaido Line.

Modern city planning has traditionally been understood as a reaction against the impact of industrialism and urban sprawl (Hall, 2011). In Japan, the original function of modern city planning was to cope with urban sprawl and guide urban development (Ishida, 2004). However, smaller towns such as Ogaki used city planning to accelerate industrialisation, expanding the urban area. In this case, city planning should be seen as part of the infrastructure system. Vitiello (2018) mentioned the significance of planners' involvement in shaping critical infrastructure[3]. According to him, innovations in infrastructure technology often spread between cities via the bureaucratic route, and infrastructure occupied a prominent position in the work of late 19th-century and early 20th-century planners. Hoeksema[4] clarified how, historically, land area changed in The Netherlands following large-scale flood protection and land reclamation measures and described relevant management methods. Demura (2018) explained how the development of the modern sewage system in Gifu rested on the regional development of huge water systems[5]. Although such examples bridge the gap between planners and constructors, few studies have aimed to understand the substructures of early city planning. It is particularly important to understand the planning process from this perspective, as this became the prototype for the current urban planning system.

THE OGAKI CASTLE TOWN IN THE FEUDAL AND EARLY MODERN ERAS

Although Ogaki is situated on the upper part of a broad fluvial field, which reaches the sea 37 km away, it is only 5 or 6 m above sea level, which is favourable for navigation but a major cause of flooding (Figure 1). The Kiso River system, which included the Ibi and Nagara Rivers prior to the Meiji Restoration (from 1867), was managed as a system of collective polders, called *Wajuu*, which consisted of areas surrounded by dikes situated among reticulated river flow. The Ogaki *Wajuu* is near the bottom of the alluvial fan of the Ibi River; accordingly, the groundwater level is high and there are scattered springs.

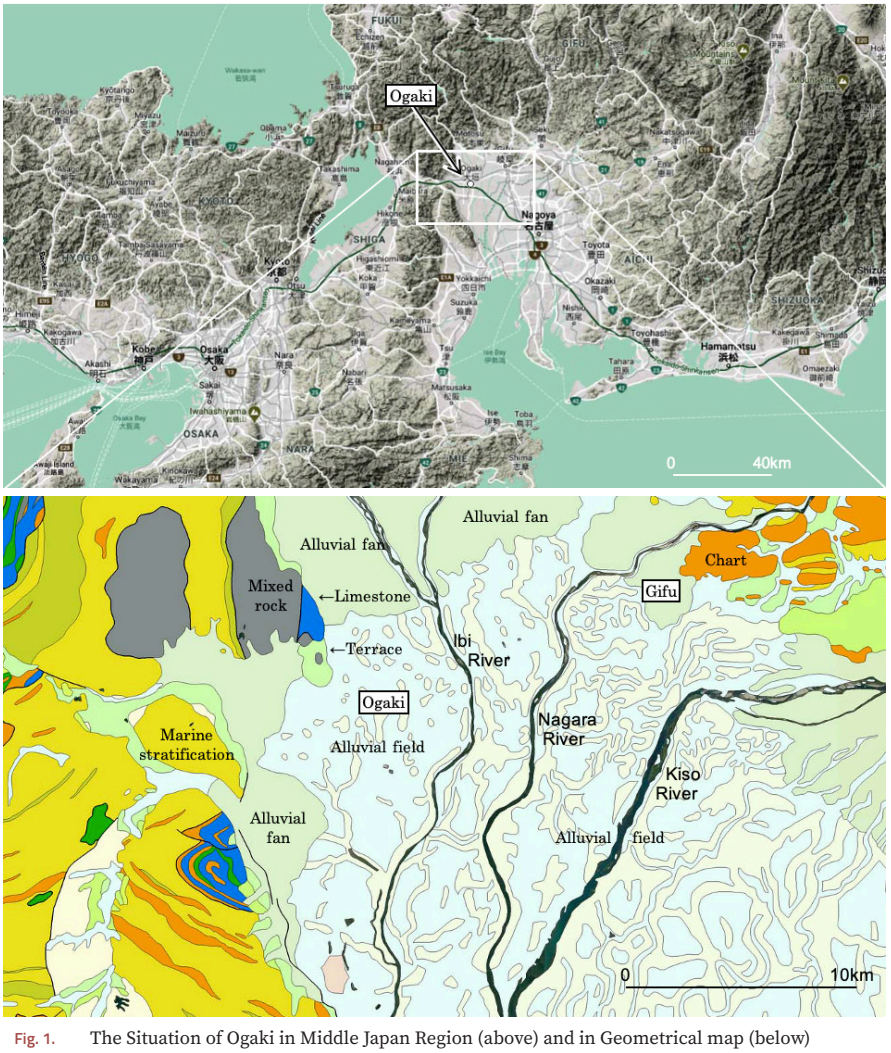

Fig. 1. The Situation of Ogaki in Middle Japan Region (above) and in Geometrical map (below)

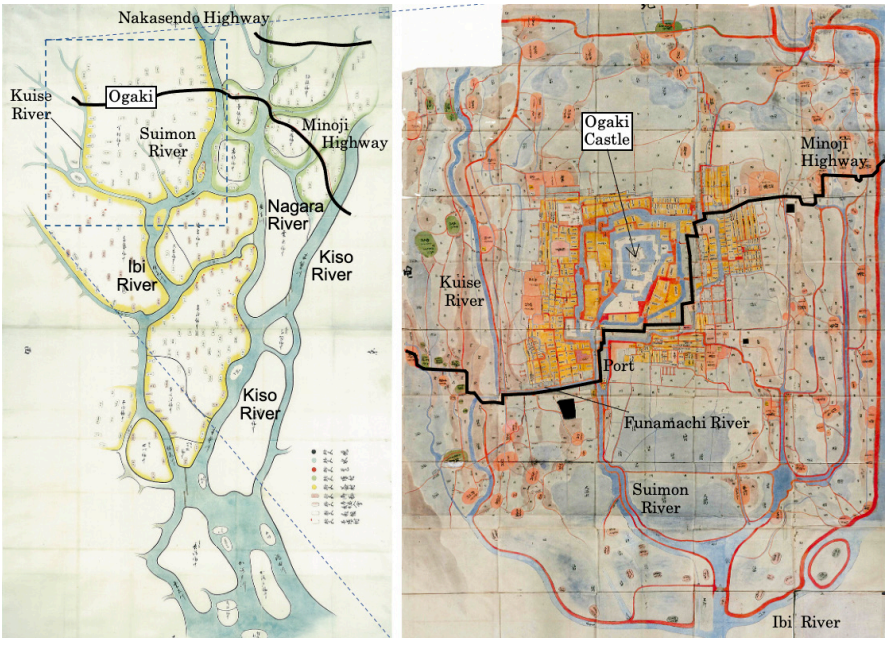

Fig. 2. The Lower Kiso River System which consisted of Collective Wajuu polders (left: the map of 18th century) and the Ogaki Castle Town in Feudal Era (right: the map drawn in 1687)

The Ogaki Castle Town, which was designated 100,000 *koku* (which traditionally means that the area had the capacity to produce food for 100,000 people) in the feudal era (Figure 2), is located where water and land traffic meet, with the rich hinterland of Mino, and was an affluent area for agricultural production. Between the Nakasendo Highway, Minoji Highway, and Suimon River, the old town was a central market for agricultural production from the Middle Ages onwards. The Kuise River runs from north to south in the west of the city and provides access to Akasaka, the area that produced the limestone used to construct the castle town. The Kuise and Suimon Rivers were connected by the Funamachi River, and Minatomachi (port district) was established at the junction of the Suimon and Funamachi Rivers. This was the port of Ogaki. The town consisted of three or four moats surrounding Ogaki Castle. Commercial and industrial functions were arranged around the Ogaki Port along the Minoji Highway, which bent around the moats to the east of the castle town. The Suimon River ran south from the port and was the main navigation route to the sea[6].

The Ogaki Station on the Tokaido Main Railway was constructed in the north of the city (1884), and a street was built to link the station to the city, thus marking the beginning of modernisation. However, Ogaki was flooded several times and suffered a huge earthquake (1891, magnitude 8.0), which hampered its economic development, whereas nearby Gifu City suffered relatively little damage and grew rapidly thereafter.

More broadly, an urgent problem faced by the early Meiji government was to reorganise the nation, transitioning away from feudal society. It was thus necessary to construct secure

routes for local industry and establish stable agricultural areas by implementing flood prevention measures. Johannis De Rijke, a Dutch engineer hired for this purpose in 1884, surveyed the Kiso River System and designed improvements. This river improvement project, carried out from 1887 to 1911, aimed to prevent floods, drain fields in dikes, and improve shipping routes. Ogaki's progress started after the 1920s, when the comprehensive regional water infrastructure system, beyond the scale of the city, was developed.

CONSTRUCTION OF THE YORO RAILWAY AND THE IBI ELECTRIC POWER PLANT

In the early modern era of the castle town, the Shizoku (ex-samurai clan) had to try to engage in business to maintain their livelihoods. In 1896, the Shizoku in Ogaki cooperated with merchants to form the Ogaki Kyoritsu Bank after terrible failures. Einosuke Toda, from a former monarch's family, became the president[7] and was also president of the Ogaki Chamber of Commerce (OCC) in 1904. He often voiced his intentions to transform Ogaki from a castle town into an industrial city. A survey of the Ibi River by members of the OCC revealed that it had the potential to generate electric power. In 1906, Toda and six other founders received permission from the prefecture to use the hydropower. In the recession that followed the Russo-Japanese War, the people of Ogaki invited Yujiro Tachikawa to manage the project. Tachikawa, who was from Ogaki Town and had run the Daishi Electric Railway in Tokyo, founded Ibi River Electric Power Co., Ltd. (IEP), in 1912 in response to the invitation[8]. At the same time, in April 1911, Mosaku Ijima, president of the Yokkaichi Chamber of Commerce, made plans to lay the Yoro Railway, and Toda and others joined him. The aim of connecting Ogaki, Kuwana, and the Yokkaichi Port was to encourage the development of industry along the line (*Yoro Railway Co., Ltd. Charter of Establishment*, 1911.4.17). Tachikawa became president of Yoro Railway Co., Ltd., established in July 1911 . In 1922, Ibi River Electric Co., Ltd. which merged with the railway company, succeeded in electrification of the railway and strengthened its capacity for industrial distribution.

According to *the Eighth Report of the Annual General Meeting of Shareholders* issued by Yoro Railway in September 1920, the transportation volume of local products increased by 19,286 tons from the previous term, resulting in a shortage of wagons and repair costs for vehicles. The operating expenses also increased by 18,364 yen from the previous term due to employee salary payments. As a countermeasure, Yoro Railway was electrified in 1923. By 1920, it was clear that electrifying the train lines to increase train speed would result in more round trips and thus more freight traffic (Kobe Shimbun, 1920.7.2). For example, cargo tonnage increased from 625,351 tons in 1921 to 1,082,078 tons in 1924, while operating expenses hardly changed (from 139,793 yen to 139,696 yen), as shown in the Fourteenth Report from the Ibi River Power Co., Ltd. in 1924.

After electrification, Yoro Railway's passenger revenue overwhelming surpassed freight revenue, although passenger revenue fluctuated according to circumstance. The fact that freight revenues remained nearly constant despite the increase in freight volume suggests that freight rates were deliberately priced irrespective of freight volume[10]. That is, it seems that

lowering the freight charges was intended to provide inexpensive industrial logistics services along the line, with support from the considerable passenger revenue[11]. This indicates that the Yoro Railroad was positioned as a common asset that should be provided to support industrial logistics in the region.

Tachikawa described the management policy of the power generation business in "Ogaki Development History" (1919): He aimed to realise a cheap continuous power supply based on hydropower that could be used by factories all day and night. An electrochemical industry was also founded that used surplus electric power and locally available limestone. Along with providing an inexpensive power supply, Tachikawa aimed to make logistical innovations to realise his vision of a prosperous industrial town[12]. The railway and power generation businesses led to the construction of two big factories by textile companies from outside the region. The conditions of the invitations to these companies stipulated that the electrical lines must be supplied by the IEP. Following these forerunners, many textile factories, including six large ones that employed more than 300 workers each, were established along the Yoro Railway up to 1920s. Some electrochemical factories also appeared (Figure 3).

IMPROVEMENT OF THE WATER COURSES

In December 1928, the Home Ministry announced a half-price subsidy for river maintenance, for which prefectures were responsible. Toda then announced the following year that the Suimon River would be improved. He said that the Suimon River should be used by industry as a means of inexpensive water transport[13]. After an active campaign, in December 1932, the Home Ministry decided to improve the Suimon River at a total construction cost of 983,500 yen[14].

Masaaki Sakata, an engineer from the Home Ministry[15], made a concrete plan for the Suimon River with the aim of improving drainage and water transport in urban areas. Around 1929, Reikichi Tamura, an engineer on the project, had come to Ogaki City to undertake a survey. Sakata announced the details of the plan arising from the survey results to Mayor Tohjima and the OCC in December 1932[16].

The survey revealed that the main cause of the frequent flooding in the Ogaki *Wajuu* polder was the fact that rivers and waterways were used for both irrigation and drainage. Organising a system to separate these functions was paramount to ensuring the stability of Ogaki's urban base. Therefore, the improvement plan (Figure 4) aimed to reorganise the small rivers into separate irrigation and drainage systems that transcended the conventional irrigation channels. After the high-water level was decreased by 1 m, the Suimon River, the main waterway, was connected to Ogaki Station, while the normal water level was maintained at 1 m or more. Sakata insisted that the water would also be a measure of future contamination caused by industrial wastewater that would be produced whenever a new factory was built in Ogaki City.

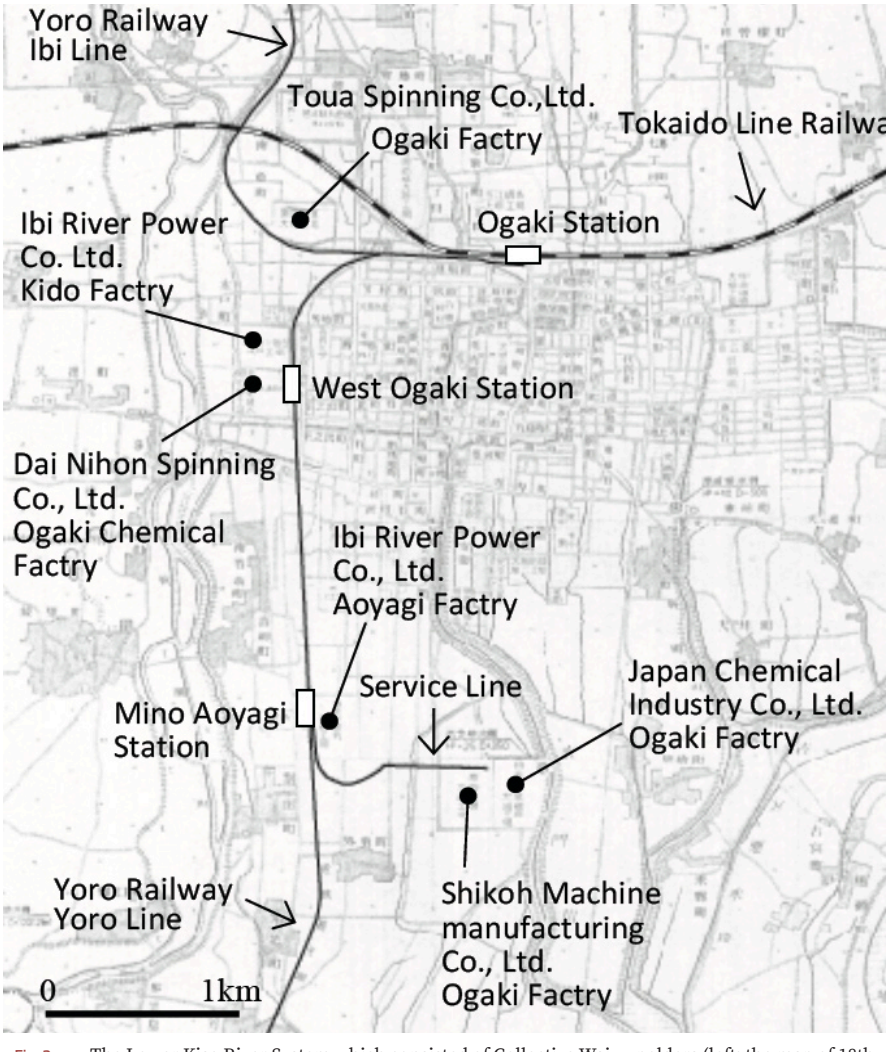

Fig. 3. The Lower Kiso River System which consisted of Collective Wajuu polders (left: the map of 18th century) and the Ogaki Castle Town in Feudal Era (right: the map drawn in 1687)

However, Sakata's emphasis was to make boat navigation more convenient. Sakata pointed out the economic benefits of water transportation, giving The Netherlands as an example, and said that it was important for connecting Ogaki's trade system to Nagoya and Yokkaichi Ports. Although the original Suimon River Improvement Plan targeted the area south of the main quay, called Orgaki Port, the route was extended so that motor ships could reach Ogaki Station. Sakata also insisted that Ogaki municipality should refurbish the dock equipment, quays, and harbours and develop more connections to railways and roads. This canal infrastructure was to function as the framework of a new logistics system. Sakata played an important role in both improving the rivers for drainage and building a logistics base by connecting railways and water transportation[17].

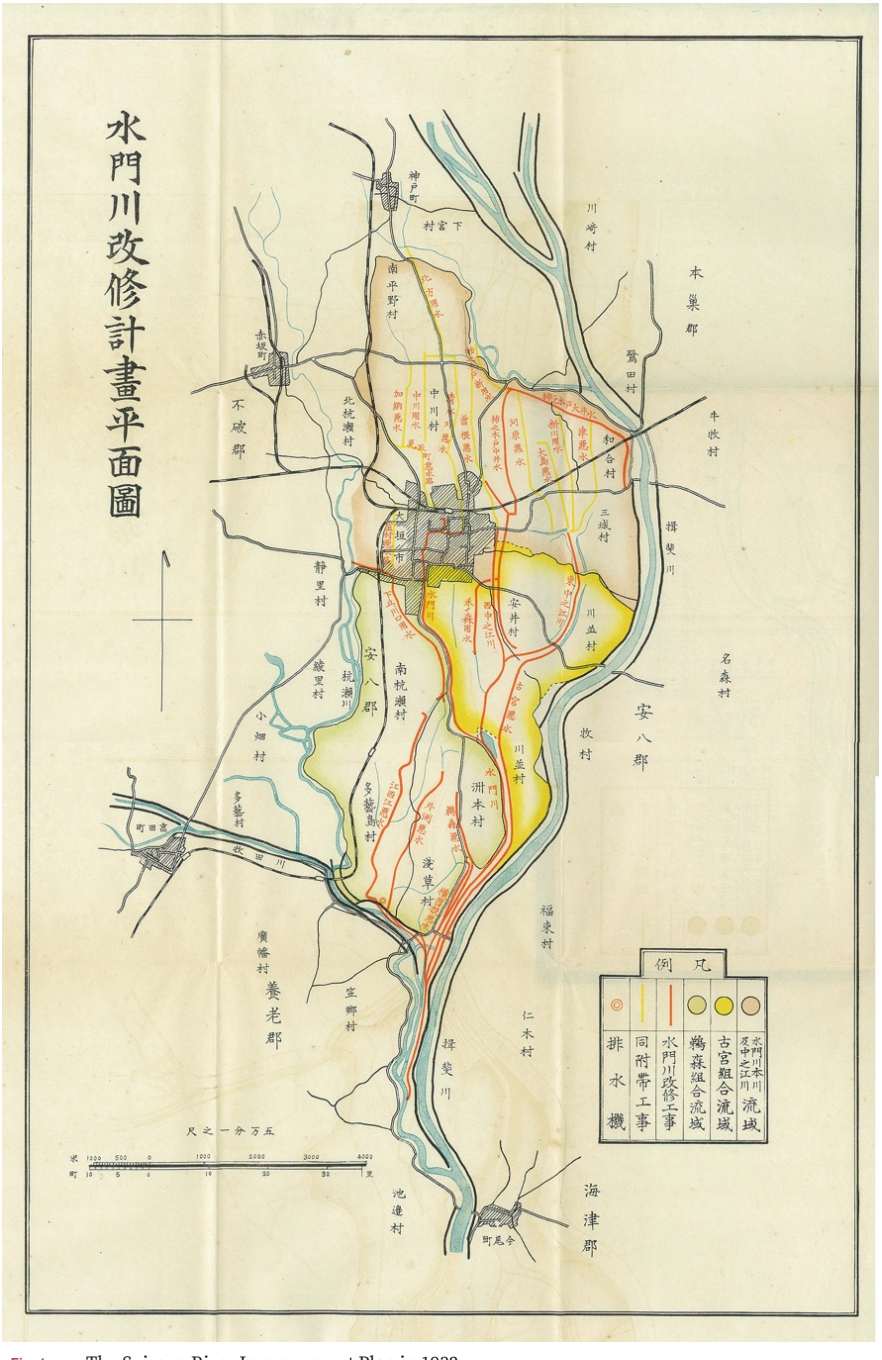

Fig. 4. The Suimon River Improvement Plan in 1932

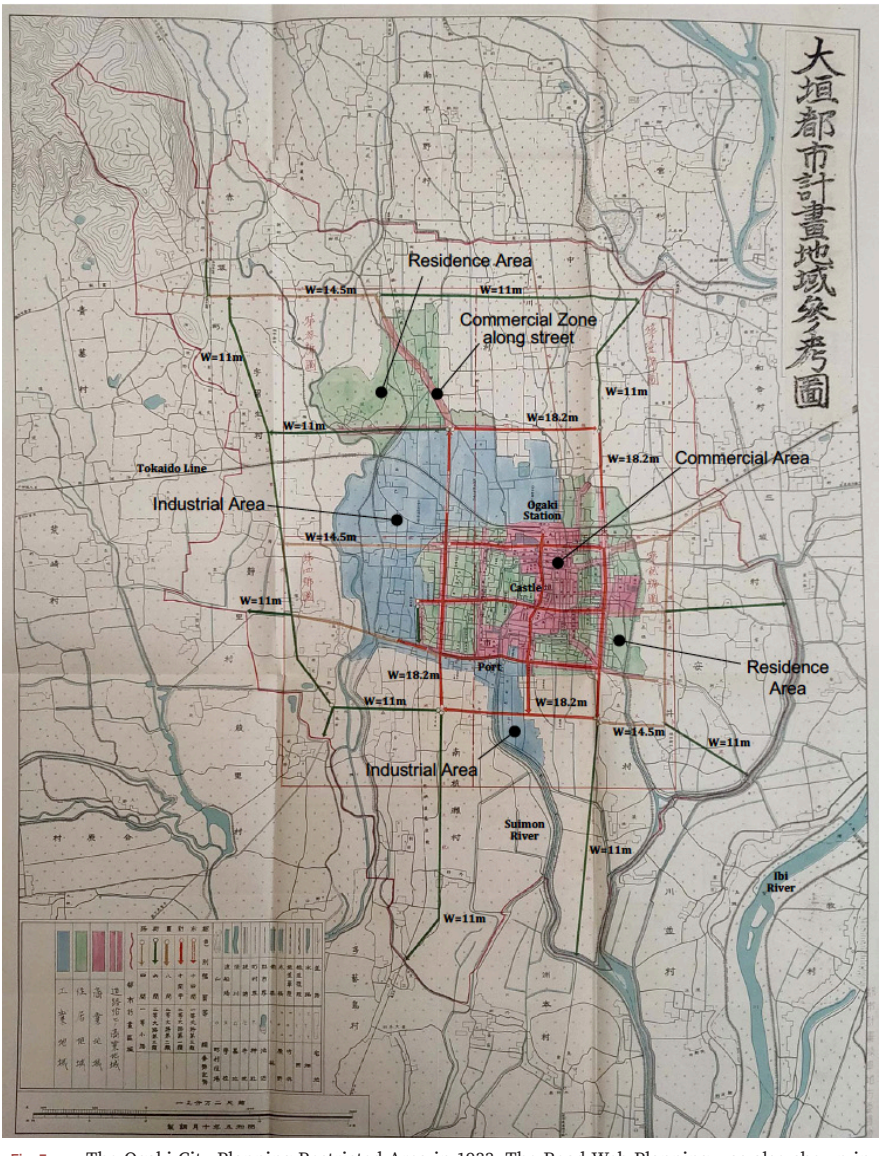

Fig. 5. The Ogaki City Planning Restricted Area in 1933. The Road Web Planning was also shown in this Plan.

OGAKI CITY PLANNING BEFORE WORLD WAR II

In November 1924, Mayor Tohjima filed a petition with the Home Ministry requesting an early application of the City Planning Act, mainly because of road problems[18]. In the next year, the City Planning Act was enacted in Ogaki City, and the City Planning Street Web was approved in July 1930. This street plan was approved to address the lack of systematic communication and width of roads[19]. Afterward, the city street plan was revised several times, and finally the street network became a grid, as shown in Figure 5. This was a standard super-grid configuration that aimed to form a new automobile distribution network by connecting stations, urban areas, and suburbs. An 8-*ken* (14.4-m wide) street extended northwest to Akasaka, where limestone was produced for both export and raw material in new electrochemical industry, which needed to be connected to Ogaki Central City Area. The northwestern suburb, which was already connected to Ogaki Station by the Yoro Railway, was also included in the new road network.

According to the description of the City Planning Restricted Area in 1933 (Figure 5)[20], the area around the Ogaki Station line was designated as a commercial area because it had previously been the commercial centre of the town. The station line had a widest width of 10.5-*ken* (about 19 m) in the street network, and the road was considered as symbolising the gateway to the town while maintaining its conventional use. To promote industrial use of the existing infrastructure, the land in the northwest and along the Suimon River was designated as an industrial area. In other words, the City Planning Gifu Regional Committee, with Akira Ando as its engineer, formulated the city street plan and restricted areas to enhance the logistical functions of the Yoro Railway and Suimon River, as the river engineer Sakata described.

Toda also considered the needs of the new industrialised society, such as the welfare and education of employees who would become its urban residents in 1918. The area around the castle and other tranquil areas were designated residential areas. However, compared to these residential areas, industrial areas with major transportation infrastructure were set aside in larger areas in a cohesive manner.

COMPLETING WATER AND LAND CONNECTION

In March 1929, Toda submitted a proposal to the prefecture to rebuild Ogaki Station, explaining the need to promote the connection between the station building and station square in future urban plans[21]. The next month, Mayor Tohjima also submitted a petition regarding this matter to the government[22]. In February 1933, the Suimon River replacement work by Ogaki City was started at a cost of 48,000 yen[23]. This work was intended as a "preparatory battle to realize a city planning road," and the ship pool in front of the Yoro Railway station was refurbished. Then, in January 1937, the Ogaki City Planning Square Project was formulated[24], and Ogaki Station was rebuilt along with the City Planning (Figure 6). With a new station street with a width of 19 m, symbolising the entrance to Ogaki, water and land transport around the station square were connected, as planned.

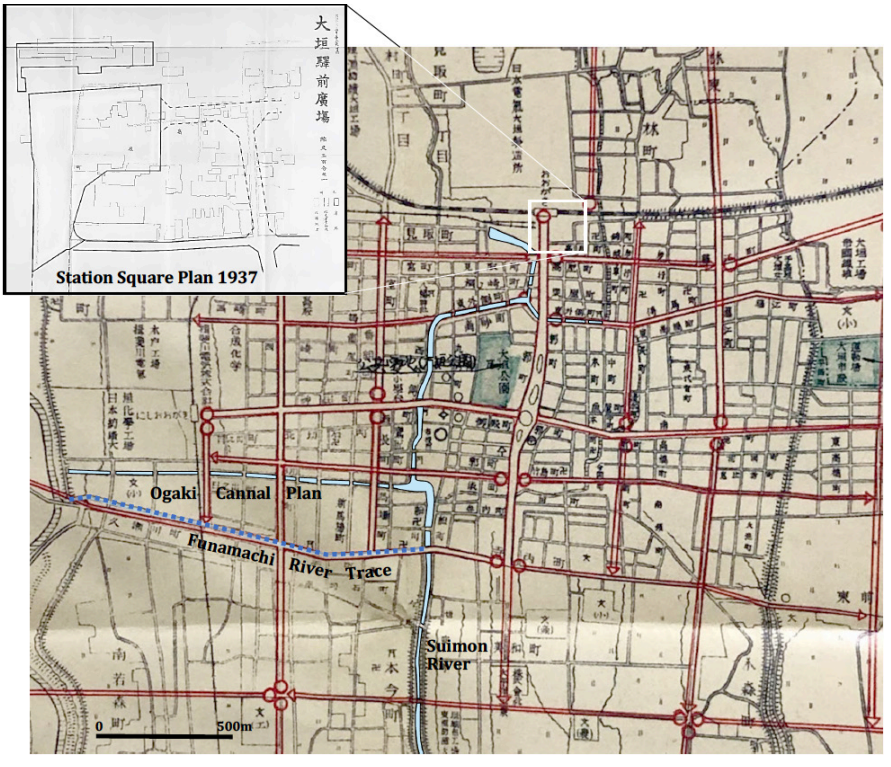

Fig. 6. The Lower Kiso River System which consisted of Collective Wajuu polders (left: the map of 18th century) and the Ogaki Castle Town in Feudal Era (right: the map drawn in 1687)

Following these projects, the Ogaki City Planning Canal Project was approved in March 1937[25] (Figure 6). In July 1934, Sakata explained to the members of the OCC and city officials that the plan would provide logistical support for supplying products and raw materials to factories[26]. In 1935, Mayor Tohjima campaigned for a new canal, insisting that it could be made possible by sharing the flow to the Ogaki Canal, reducing the amount of water provided downstream to the Kuise River, and increasing the drainage capacity. This would increase the amount of water in the Suimon River and make water transportation more convenient[27]. In April 1936, the city council unanimously agreed to begin constructing the canal.

In May 1936, Kiyonori Abe[28], an engineer at the Nagoya Civil Engineering Office of the Home Ministry, and planning engineer Ando conducted a field survey and found the plan to be promising[29]. They stated that the Ogaki Canal construction would be promoted at a cost of 300,000 yen as a City Planning Project. Mayor Tohjima requested a subsidy of 100,000 yen from the government and prefecture[30]. The Ogaki City Planning Canal Decision Paper, approved in 1937, stated that connecting the Suimon and Kuise Rivers would contribute to the development of industrial areas[31]. The canal connecting the Suimon and Kuise Rivers was designed with a cross-section 1 m deep, a 9-m bottom width, and a 12-m open surface width based on the shapes of ships (average width: 2.5 m, length: 14–15 m), with a length of 1,030 m.

Locks were planned at two locations to enable adjustment of the water levels. To facilitate the shipment of luggage, a 3-m unloading site was set up adjacent to the Kuise River, and a 300-m storage reservoir was planned adjacent to the Suimon River[32].

According to a previous study[33], the main aim of this construction was not to improve transportation as declared, but to improve the drainage of wastewater from new factories. The author argued that it explains why this canal ended up just draining water and was not completed, even though this genuine purpose was concealed. However, as mentioned previously, the Suimon River improvement project was obviously for both drainage and transportation. Furthermore, efficient water transportation was part of the grand design of Ogaki as developed by Toda and Sakata. It is also true that the Funamachi River had to be separated from the Ogaki Canal, which served as a drainage channel, because it supplied irrigation water to the Suimon River Improvement Project. As described previously, the main purpose of this project was to separate irrigation and drainage. At least at this time, Ando, as the city planning engineer, worked with the Home Ministry as a technical consultant to realise "the River Port Ogaki" and make it a major collection and distribution place, with a hinterland in the Seino region[34].

In June 1936, Ando spoke to Mayor Tohjima about the canal construction and said that they would create "a splendid thing like the Nakagawa Canal[35]". The Nakagawa Canal was completed in 1932 in Nagoya City. The engineer, Hideaki Ishikawa of the Aichi Regional Committee for Urban Planning, explained that Nakagawa Canal should be on *Toshi Koron* in 1930[36]. That is, the plan was to connect the ship pools near Nagoya Station to the Nagoya Port, to obtain financial resources through riverside development by excess expropriation, and to turn the area along the canal into an industrial area. Ando's statement of "a splendid thing like the Nakagawa Canal" was thought to refer to this, and the bank of the Ogaki Canal was planned to be an industrial area, to be paid for by the beneficiaries[37]. Ando was actively involved in planning the canal and played a role in promoting its construction by coordinating the positions of the mayor, prefectural assembly, and Home Ministry. It is thought that the legacy of Toda's vision and Sakata's technical expertise had been maintained because Mayor Tohjima and other bureaucrats inherited their policies. In addition, the combination of urban planning and the development of logistics for commerce and industry proved to be very fruitful.

CONCLUSION

The Ogaki Castle Town grew at the junction of land highways and waterways connected to the sea. In the feudal era, the town consisted of three moats surrounding a castle and a commercial area along the port, moats, and highway. The configuration of the castle town was reorganised because of the development of industry. The Ogaki Chamber of Commerce, which united the ex-samurai class and the merchants and was formed after struggles in the early modern era, established the Yoro Railway Co., Ltd. (1911). The aim of this company was to develop a line running north and south through Honshu Island, which would help Ogaki become a new logistics base. The Ibi River Electric Power Co., Ltd., was established (1912) to supply hydroelectric power and was used to promote industry. After the completion of the

Yoro Railway (1919), the Ibi River Electric Power succeeded in electrifying the railway (1922) and strengthened industrial distribution. The abundance of groundwater and spring water led to the Suimon River Improvement Plan (1932), which aimed to reinforce the use of the river as a transportation link, and Ogaki Station was connected to the Suimon River. When the Ogaki City Planning Street Web (1930) and the Ogaki City Planning Canal Project (1937) were developed, the cooperation among flood control, energy supply, water transportation, and land transportation had come to fruition.

The infrastructure development required to construct an industrial city should be investigated focused on the relationships between each project. This was the essence of the resilience of Ogaki's infrastructure system that was created through a series of projects. In other words, the water infrastructure of pre-modern origin was utilized as a foundation for the reintroduction of the water transportation that supports modern industry by strengthening it and connecting it to the railroad as a new land transportation system. This was comprehensively organized through city planning as a new system. Furthermore, it is understood that the resilience was achieved by the relationships among individuals, such as engineers and bureaucrats, who worked personally between projects.

These projects were based on more than 30 years of continuous improvement, which started with the construction of electric power and a logistics infrastructure under the leadership of the families of the *samurai* class in conjunction with commercial and industrial enterprises. And they were completed with a city planning to coordinate each project. In particular, a river engineer provided technical support, and a planning engineer consulted on land systems. Information was shared seamlessly to support the flow of transportation links across each jurisdiction. In other words, the concept of industrial urbanisation was shared, even prior to the development of the master plan, and each agency advanced toward this aim.

ENDNOTES

1. Spiro Kostof, *The City Shaped: Urban Patterns and Meanings Through History* (London: Thames & Hudson, 1991), 179.
2. Junichiro Asano, "A Study on Design Technique and Design Thought of the First Decision of City Planning Area by the City Planning Act of 1919," *Journal of Architecture and Planning*, No.595 (September 2005): 125-132.
3. Domenic Vitiello, "Planning for Infrastructure: Lifelines, Mobility, and Urban Development," in *The Routledge Handbook of Planning History*, ed. Carola Hein (New York: Routledge, 2018): 325-337.
4. Robert J. Hoeksema, *Designed for Dry Feet, Flood Protection and Land Reclamation in the Netherlands* (Reston: American Society of Civil Engineers, 2006).
5. Yoshifumi Demura, "Modern Regional Development in Japan: From the Kiso River Improvement Project to the City Planning of Gifu," The 18th IPHS Conference Proceedings (2018): 569-580
6. Ken Okajima, "The Development of the Modern City Ogaki and Usage of River Transportation," the Transactions of the Academic Society of the Humanities in Kokushikan University, no.37 (March 2005). 155-174.
7. Ogaki Kyoritsu Bank, *Ogaki Kyoritsu Bank Centenary History* (Ogaki: Sun Messe Co., Ltd, 1997), 15.
8. Ibiden Corporation Company History Compilation Office, *Ibiden Corporation 70 Years History* (Ibiden Co., Ltd, 1982).
9. Saichi Uesugi, *70 Years History after Opening of Yoro Railway* (Kintetsu Co., Ltd, 1983).
10. Before electrisation, Shipping amount was about between 40,000 and 50,000 tons, and arrival amount was between 50,000 and 80,000 tons. Shipping amount was not changed much, but arrival amount was dramatically increase to about 140,000 tons. Passenger revenue was always far beyond one of cargo, for ex-

ample, about 9 times in 1917, 6 times in 1922, and 5 times in 1925. Moreover, cargo revenue was not changed much in any year; less than 50,000 yen. (Gifu Prefectural Statistics from 1913 to1925).

11. After Opening the line between Ikeno, Ogaki, and Yoro in July 1913, Yoro Railway issued the guide to explain the prospect of the Yoro Park development that new between Yoro Station and the park, hot spa, hotels and several other amusement facilities such as zoo, botanical garden, athletic field, and observatory would be constructed. In the Yoro Park, there was famous water fall which was a centre of the tourism development as shown in "The Guide of Scenic Spots along Yoro Railway" (Yoro Railway Co., Ltd., 1913.8.10).
12. Yujiro Tachikawa: The Power of Ibi River and Future of the Electric Era 揖斐川の電力と電気事業の将来, (Mino Shimbun Company: The Ogaki Development History, 1918). 233-238.
13. "Proposal on The Suimon River Improvement," *The Monthly Report of Ogaki Chamber of Commerce and Industry*, February, 1929.
14. Gifu Prefecture, *The Description of the Suimon River Improvement Project*, December, 1932.
15. Sakata graduated from Tokyo Imperial University in July 1913, and worked for the Home Ministry. After numerous river improvement projects, he became a chief engineer of the Kiso River Upstream Improvement Office in May 1929. he worked as director there, and then he became the technical manager of the Nagoya Civil Engineer Office. he retired in 1934. (Ministry of Construction Chubu Regional Construction Bureau Kiso River Upstream Construction Office, *The History of the Flood Control in Kiso Three Rivers*, 1969, 51).
16. Gifu Prefecture, *The Suimon River Improvement and Ogaki City* (Ogaki: Seino Publish Co., Ltd., 1933).
17. Ibid.
18. "City Planning for Ogaki City," *The Monthly Report of Ogaki Chamber of Commerce and Industry*, November, 1924.
19. National Archive Collection, "The Decision of Ogaki City Planning Street," July 12, 1930.
20. National Archive Collection, "The Decision of Ogaki City Planning Restricted Areas," March 13, 1933.
21. "Prospects of the Overpass in Ogaki Station. The Remodelling of Station Building is Promising," *The Monthly Report of Ogaki Chamber of Commerce and Industry*, March, 1924.
22. "The Expansion of Ogaki Station Building likely to be Realized. Mayor's Petition in Tokyo" *The Monthly Report of Ogaki Chamber of Commerce and Industry*, April, 1929. Then in January 1935, Toda had filed with the railway authority ("The Petition for Remodelling of Ogaki Station Building Repeatedly," *The Monthly Report of the Ogaki Chamber of Commerce and Industry*, February, 1935.).
23. "The Replacement Work of Suimon River in front of Station, the First Step to Tomorrow's Ogaki," *Osaka Asahi Shimbun*, February 24, 1933.
24. National Archive Collection, "The Decision of Ogaki City Planning Square and Its Project with Execution Year Schedules," January 15, 1937.
25. National Archive Collection, "The Decision of Ogaki City Planning Canal and Its Project with Execution Year Schedules," March 17, 1937.
26. "Construction of the Canal connecting between Suimon River and Kuise River." *The Monthly Report of the Ogaki Chamber of Commerce and Industry*, August, 1934.
27. "The Petition for the Construction of the New Canal between Suimon River and Kuise River." *The Monthly Report of the Ogaki Chamber of Commerce and Industry*, December, 1935.
28. Abe became a chief of the Kiso River Upstream Improvement Office in 1934 when Sakata retired as his successor (Ministry of Construction Chubu Regional Construction Bureau Kiso River Upstream Construction Office, *The History of the Flood Control in Kiso Three Rivers*, 1969, 443).
29. "The Cannal of Ogaki, No Difficulty in Realization, There is a Way of Resources" *Gifu Nichinichi Shimbun*, April 15, 1936.
30. 'The pettition for Subsidy of 100,000 yen for the Ogaki Canal, the Construction would be Started in This Year' (Gifu Nichinichi Shimbun, 1936.5.3).
31. National Archaive Collection, "The Decision of Ogaki City Planning Canal and Its Project with Execution Year Schedules," March 17, 1937.
32. "Ogaki Canal can be Excavated at Construction Cost of 188,000 yen," *Mino Taisho Shimbun*, June 20, 1936.
33. Tsuneki Mizuta, "A Study on a Pre-Modern Canal and a Modern Canal in Ogaki City," *Journal of Architecture and Planning*, Vol. 78, No.686 (April 2013): 941-948.
34. "Realisation of River Port Ogaki is Coming, Progress of Negotiation with the Head Office," *Osaka Asahi Shimbun*, February 9, 1937.
35. "Engineer Ando Inspected the Construction of Ogaki Canal and Station Square," *Gifu Nichinichi Shimbun*, June 28, 1936.
36. Hideaki Ishikawa, "Nakagawa Cannal as The Center 中川運河を中心として," *Toshi Kohron*都市公論, Vol.13, no.8 (September 1930): 73-82.
37. "Execution of Ogaki City Planning Canal, Committee Decided Its Attitude," *Gifu Shimbun*, April 26, 1936.

BIBLIOGRAPHY

Asano, Junichiro. "A Study on Design Technique and Design Thought of the First Decision of City Planning Area by the City Planning Act of 1919." *Journal of Architecture and Planning*, No.595 (September 2005): 125-132.

Demura, Yoshifumi. "Modern Regional Development in Japan: From the Kiso River Improvement Project to the City Planning of Gifu," *The 18th IPHS Conference Proceedings* (2018): 569-580.

Gifu Prefecture. The Description of the Suimon River Improvement Project. December 12, 1932.

Gifu Prefecture. *The Suimon River Improvement and Ogaki City*. Ogaki: Seino Publish Co., Ltd., 1933.

Hoeksema, J. Robert. *Designed for Dry Feet, Flood Protection and Land Reclamation in the Netherlands*. Reston: American Society of Civil Engineers, 2006.

Ibiden Corporation Company History Compilation Office. *Ibiden Corporation 70 Years History*. Ogaki: Ibiden Co., Ltd., 1982.

Ishikawa, Hideaki. "Nakagawa Cannal as The Center 中川運河を中心として." *Toshi Kohron*都市公論, Vol.13, no.9 (September, 1930): 73-82.

Kostof, Spiro. *The City Shaped: Urban Patterns and Meanings Through History*. London: Thames & Hudson, 1991.

Ministry of Construction Chubu Regional Construction Bureau Kisogawa Upstream Construction Office. *The History of the Flood Control in Kiso Three Rivers*. Nagoya: Syowa Print Company, 1969.

Mino Shimbun Company. *The Ogaki Development History* (大垣発展史). Ogaki: Seinoh Publishing Co., Ltd. 1918.

Mizuta, Tsuneki. "A Study on a Pre-Modern Canal and a Modern Canal in Ogaki City." *Journal of Architecture and Planning*, Vol. 78, No.686 (April, 2013): 941-948.

National Archive Collection. "The Decision of Ogaki City Planning Street," July 7, 1930.

National Archive Collection. "The Decision of Ogaki City Planning Restricted Areas," March 13, 1933.

National Archive Collection. "The Decision of Ogaki City Planning Square and Its Project with Execution Year Schedules." January 15, 1937.

National Archive Collection. "The Decision of Ogaki City Planning Canal and Its Project with Execution Year Schedules." March 17, 1937.

National Archive Collection. "The Decision of Ogaki City Planning Canal and Its Project with Execution Year Schedules." March 17, 1937.

Ogaki City. *The History of Ogaki City* (大垣市史). Ogaki: Japan Art Print Co., Ltd.,2009.

Ogaki Kyoritsu Bank. *Ogaki Kyoritsu Bank Centenary History* (大垣共立銀行百年史). Ogaki: Sun Messe Co., Ltd., 1997.

Okajima, Ken. "The Development of the Modern City Ogaki and Usage of River Transportation." *The Transactions of the Academic Society of the Humanities in Kokushikan University*, no.37, (March 2005): 155-174.

Uesugi, Saichi. *70 Years History after Opening of Yoro Railway*. Self-publishing, 1983.

Vitiello, Domenic. "Planning for Infrastructure: Lifelines, Mobility, and Urban Development." In *The Routledge Handbook of Planning History*, edited by Carola Hein, 325-337. New York: Routledge, 2018.

IMAGE SOURCES

Fig. 1: Google Map (above) and Geological Survey of Japan web page (https://gbank.gsj.jp/geonavi/) (below).
Fig. 2: Gifu Prefecture Historical Archive (left) and *The History of Ogaki City (right)*.
Fig. 3: *The History of Ogaki City*.
Fig. 4: Digital Archives of JSCE Library [Old Collection of Hideyoshi Sanada. 4488].
Fig. 5: Statistics of Gifu Prefecture from 1923 to 1935.
Fig. 6: National Archives of Japan [02293100] (above) and *The History of Ogaki City* (below).

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DISCLOSURE STATEMENT

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